EXHIBIT D

US8243045	OnePlus 9 Pro (“The accused product”)
1. A device that is responsive to a touch from a user, the device comprising:	The accused product is a device that is responsive to a touch from a user. OnePlus 9 Pro  https://www.oneplus.com/9-pro/specs?_ga=2.75135643.80513312.1641875838-207069975.1637918088

	Features Hyper Touch Reading Mode Night Mode Vibrant Color Effect Pro Motion Graphics Smoothing Ultra-high Video Resolution Adaptive Display https://www.oneplus.com/9-pro/specs?_ga=2.209427995.865394404.1641908992-863913173.1641908992 OnePlus 9 | OnePlus 9 Pro **Display** **Parameters** Size: 6.7 inches (Measured diagonally from corner to corner.) Resolution: 3216 X 1440 pixels 525 ppi Aspect Ratio: 20.1:9 Type: 120 Hz Fluid AMOLED with LTPO Support sRGB, Display P3, 10-bit Color Depth Cover Glass: Corning® Gorilla® Glass https://www.oneplus.com/9-pro/specs?_ga=2.75135643.80513312.1641875838-207069975.1637918088
a display comprising a plurality of touch-	The accused product comprises a display comprising a plurality of touch-sensitive locations.

sensitive locations;	OnePlus 9 Pro

https://www.oneplus.com/9-pro/specs?_ga=2.75135643.80513312.1641875838-207069975.1637918088

Features

Hyper Touch
Reading Mode
Night Mode
Vibrant Color Effect Pro
Motion Graphics Smoothing
Ultra-high Video Resolution
Adaptive Display

https://www.oneplus.com/9-pro/specs?_ga=2.75135643.80513312.1641875838-207069975.1637918088

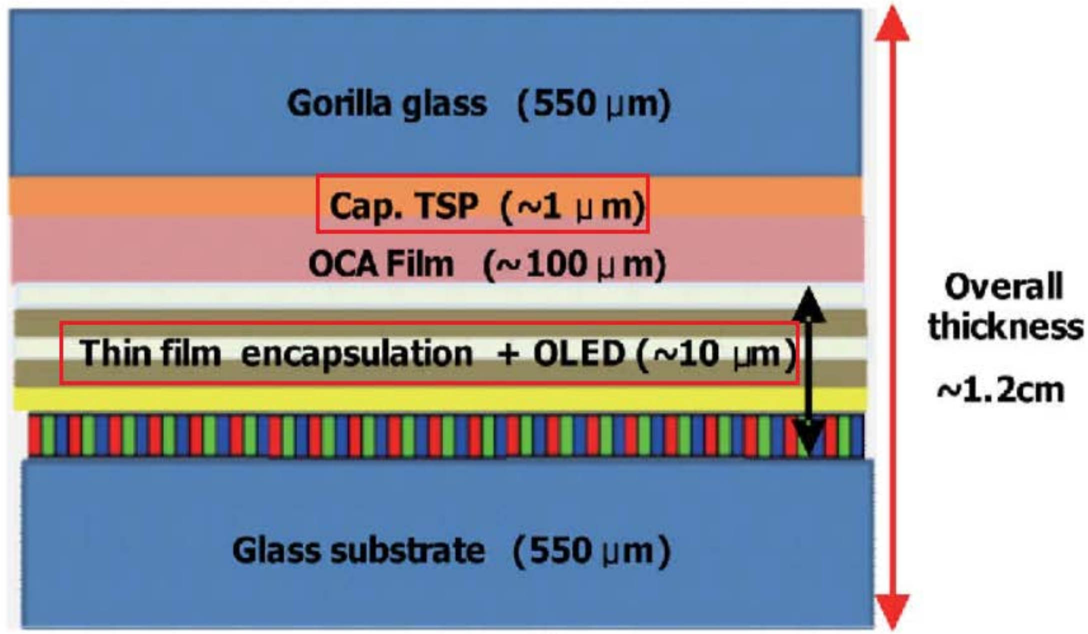
OnePlus 9 Pro	**Yes**
Mtech G9	**Unknown**

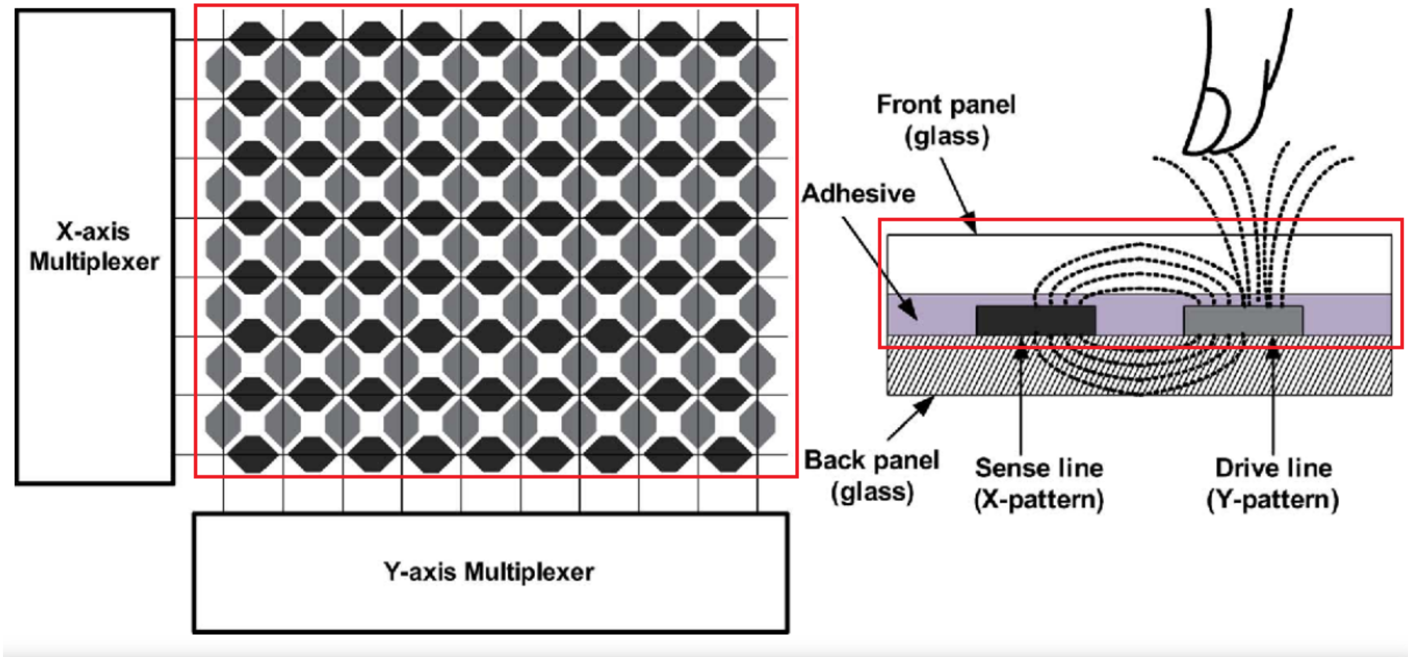
OnePlus 9 Pro has a capacitive touch screen which is **more responsive** than a resistive (not so sensitive) touchscreen.

https://www.smartprix.com/mobiles/oneplus_9_pro_vs_mtech_g9-cpd1exvjd04k_1101tegrabk.php

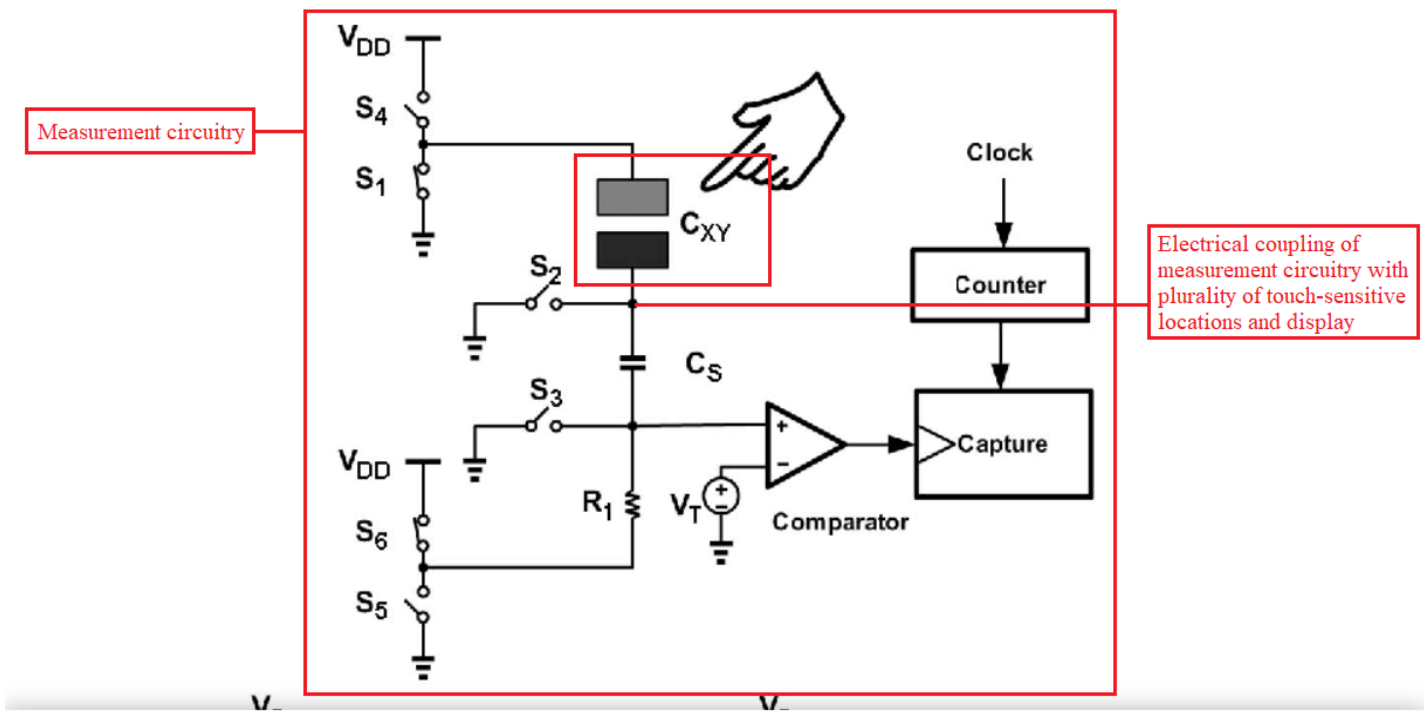
DISPLAY	
Type	LTPO Fluid AMOLED Display Capacitive Touchscreen, 1B Colors, Multitouch
Display Size	6.7 Inches
Resolution	1440 x 3216 Pixels
CAMERA	
Back Camera	48MP + 8MP + 50MP + 2MP, autofocus, LED Flash
Front Camera	16MP (Selfie Camera)
Camera Features	Hasselblad Color Calibration, Dual-LED Flash, Auto-HDR, Panorama

https://www.electrorates.com/oneplus-9-pro-5g-price-in-ghana-1064.php

	 (b) Fig. 5. (a) Cross-sectional diagram of the ultrathin AMOLED display using Cap-TSPs composed of thin-film encapsulation and RGB OLED microcavitys. The Cap-TSP is fabricated on the underside of the glass protection layer... Expand https://www.semanticscholar.org/paper/A-Highly-Sensitive-Capacitive-Touch-Sensor-on-a-for-Kim-Choi/fcda707938bf666cdda492754c9f17db346713d6 Fig. 5 shows a schematic view of the capacitive touch sensors integrated onto the thin-film-encapsulated OLED display. The implementation of the OLED panel starts with https://pdfs.semanticscholar.org/fcda/707938bf666cdda492754c9f17db346713d6.pdf

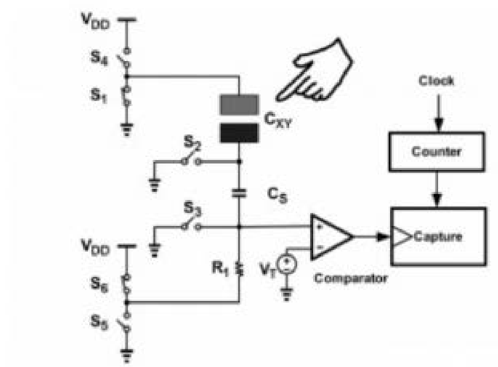
	 Fig. 1. Capacitive touch sensor panels, with the X–Y electrodes and their corresponding mutual capacitances in the touch screen. https://www.semanticscholar.org/paper/A-Highly-Sensitive-Capacitive-Touch-Sensor-on-a-for-Kim-Choi/fcda707938bf666cdda492754c9f17db346713d6/figure/0

	The main capacitive touch sensing principle is to detect the change in capacitance when a user touches the screen. As shown in Fig. 1, the X–Y grid in the touch screen is made by etching a layer to form a pattern of electrodes. As can be seen, mutual capacitances are observed at the intersections of two electrodes, which are due to the fact that the two conductive objects (the X–Y electrodes) are able to hold a charge if they are very close together. A human finger placed near the intersection of two electrodes changes the mutual capacitance value; sensing circuitry measures these capacitance changes. https://pdfs.semanticscholar.org/fcda/707938bf666cdda492754c9f17db346713d6.pdf
measurement circuitry electrically coupled to both the display and to each of the plurality of touch-sensitive locations, wherein each of the touch-sensitive locations affected by the touch generates a respective signal change	The accused product comprises a measurement circuitry electrically coupled to both the display and to each of the plurality of touch-sensitive locations, wherein each of the touch-sensitive locations affected by the touch generates a respective signal change having a magnitude corresponding to a strength of the touch in its respective associated measurement circuitry.

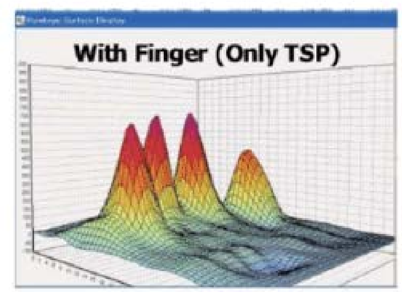
having a magnitude correspondin g to a strength of the touch in its respective associated measurement circuitry; and	 Fig. 4. Capacitive touch sensor circuitry and the timing diagram of the sensing operation. https://www.semanticscholar.org/paper/A-Highly-Sensitive-Capacitive-Touch-Sensor-on-a-for-Kim-Choi/fcda707938bf666cdda492754c9f17db346713d6/figure/3 OLED panels. Fig. 7(b) and (d) illustrates multiple touches, where our capacitive touch sensor is interpreted as a signal using a mutual capacitive array so that the capacitive coupling at each point in the matrix can be sensed independently (Table I). https://pdfs.semanticscholar.org/fcda/707938bf666cdda492754c9f17db346713d6.pdf

	The main capacitive touch sensing principle is to detect the change in capacitance when a user touches the screen. As shown in Fig. 1, the X–Y grid in the touch screen is made by etching a layer to form a pattern of electrodes. As can be seen, mutual capacitances are observed at the intersections of two electrodes, which are due to the fact that the two conductive objects (the X–Y electrodes) are able to hold a charge if they are very close together. A human finger placed near the intersection of two electrodes changes the mutual capacitance value; sensing circuitry measures these capacitance changes. https://pdfs.semanticscholar.org/fcda/707938bf666cdda492754c9f17db346713d6.pdf

they are very close together. A human finger placed near the intersection of two electrodes changes the mutual capacitance value: sensing circuitry measures these capacitance changes. The changes of the capacitance are mainly due to the fact that a finger disturbs the fringing electric field above the sensor, which means that some of the charge is transferred to the user and so reduces the capacitance between the electrodes. In order to detect the capacitance variation, several techniques such as successive approximation [15], a relation oscillator [16], [17], and an *RC* delay technique [18] have been studied. One of the most effective techniques is found in the charge transfer approach, where a higher sensing sensitivity can be achieved since only the amount of transferred charge is sensed [19].

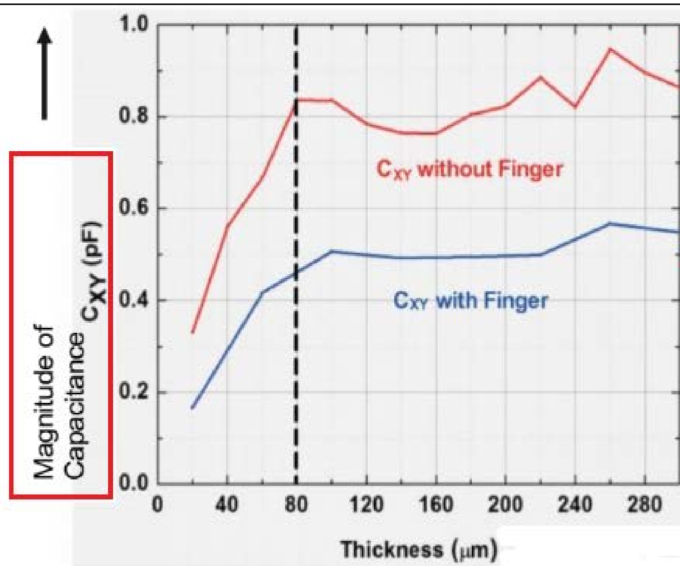


A capacitive touch sensing operation using the charge transfer approach is shown in Fig. 3. A switched capacitor circuit is used to assess the relative change in a sensor's capacitance when the screen is being touched. C_{XY} is the unknown mutual capacitance found between two electrodes (X–Y patterns), and



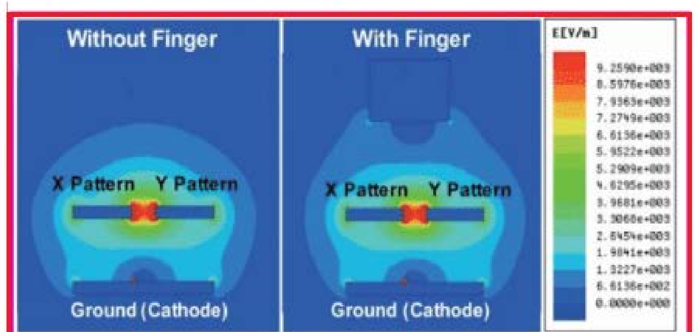
(b)

https://pdfs.semanticscholar.org/fcda/707938bf666cdda492754c9f17db346713d6.pdf



(d)

Change in signal (capacitance) triggered by touch.

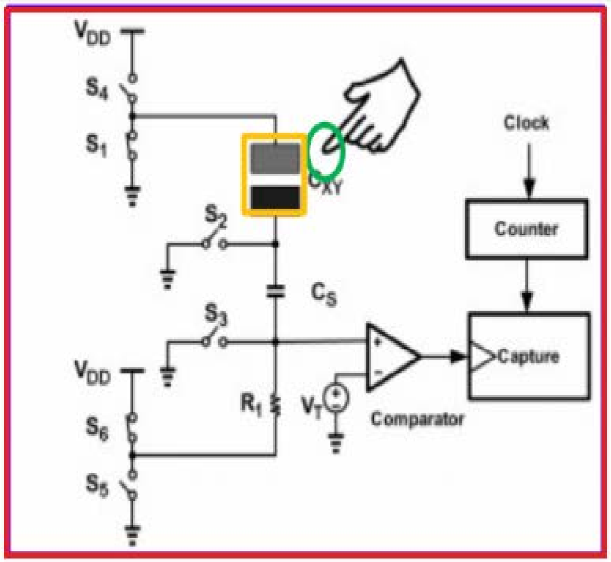


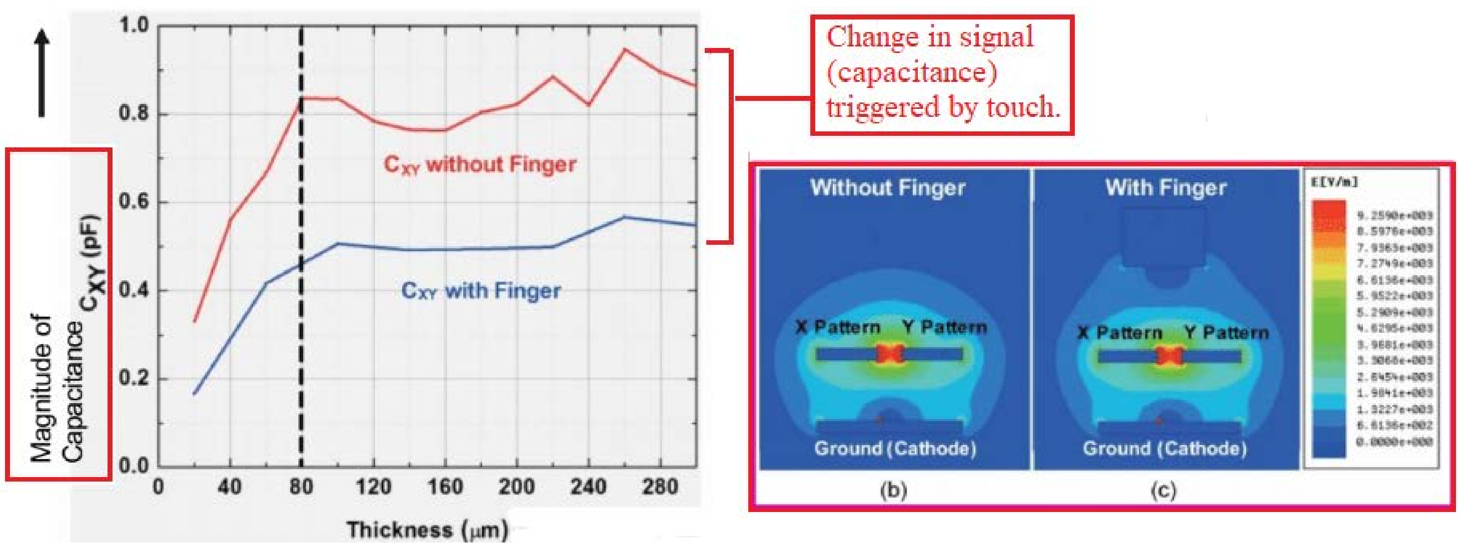
(b) (c)

Without a finger, as can be seen in Fig. 6(b), the fields are mostly contained between the X and Y patterns, generating capacitance C_{XY} between them. As a user touches the panel with a finger, Fig. 6(c) shows that the electric fields are diverted from C_{XY} to ground through the finger, reducing the C_{XY} value. Because a reduced OCA thickness results in thinner display devices, it is important to estimate the minimum OCA thickness needed to maintain the sensitivity of the C_{XY} difference between the two cases with respect to electrical noise. Fig. 6(d) shows C_{XY} with and without a finger, respectively, versus the OCA thickness. For the given OCA thickness range, the CXY has a range of 0.33–0.86 pF (without a finger) and 0.17–0.55 pF (with a finger). While the C_{XY} variation main-

APPENDIX

https://pdfs.semanticscholar.org/fcda/707938bf666cdda492754c9f17db346713d6.pdf

a processor coupled to the measurement circuitry, wherein the processor is configured to receive a plurality of respective signal changes from the measurement circuitry corresponding to a plurality of the touch-sensitive locations affected by the touch, and wherein the processor is further configured to determine a location of the touch by identifying one or more touch-	The accused product comprises a processor (e.g., Synaptics Rio Touch Controller) coupled to the measurement circuitry, wherein the processor (e.g., Synaptics Rio Touch Controller) is configured to receive a plurality of respective signal changes from the measurement circuitry corresponding to a plurality of the touch-sensitive locations affected by the touch, and wherein the processor (e.g., Synaptics Rio Touch Controller) is further configured to determine a location of the touch by identifying one or more touch-sensitive locations of the plurality of the touch-sensitive locations affected by the touch where the respective signal change has a highest magnitude.  Fig. 4 shows the touch sensing circuitry using the charge transfer approach. It consists of ramp-up resister (R_1), comparator, capture register, and counter. When the counter starts, S_5 is opened, and S_6 is closed in order to set the initial voltage of C_S to the supply voltage V_{DD}. During the sensing operation, the voltage on C_S decreases, and when the voltage crosses the threshold voltage (V_T), the capture register latches the counter's output. When a human finger is not placed on the screen, the charge on C_S is transferred relatively quickly, thus generating a small counter value. Conversely, when a finger is placed on the screen, since the charge is transferred more slowly, the latched counter value is larger. The timing diagram of the sensing operation is illustrated in Fig. 4. https://pdfs.semanticscholar.org/fcda/707938bf666cdda492754c9f17db346713d6.pdf

sensitive locations of the plurality of the touch-sensitive locations affected by the touch where the respective signal change has a highest magnitude.	**Components of a Touch Screen** A touch screen typically has the following basic components: ▪ **Touch sensor** – A touch-responsive surface, typically a glass panel that is placed over a visual display monitor. The technologies vary slightly, but typically, the sensor registers change in electrical signal distortion to sense a touch event and location. ▪ **Controller** – An electronic device (PCB) is the interface between the sensor and the display. The controller takes information from the touch screen and translates it into information a computer can understand. http://www.sensigraphics.com/products/touch-screens/  https://pdfs.semanticscholar.org/fcda/707938bf666cdda492754c9f17db346713d6.pdf

	OLED panels. Fig. 7(b) and (d) illustrates multiple touches, where our capacitive touch sensor is interpreted as a signal using a mutual capacitive array so that the capacitive coupling at each point in the matrix can be sensed independently (Table I). https://pdfs.semanticscholar.org/fcda/707938bf666cdda492754c9f17db346713d6.pdf APPLICATIONS TECHNOLOGY synaptics DOWNLOADS COMPANY Synaptics Rio Touch Controller Enables Power-Efficient LTPO Display Panels in Premium OLED Mobile Devices from Oppo and OnePlus The Synaptics Rio touch controller enables a best-in-class touch experience on LTPO display in the Oppo Find X3/X3Pro and OnePlus 9/9Pro devices. In a recent review of the OnePlus 9, Tom's Hardware noted: "A newcomer to the LTPO mix, the OnePlus 9 Pro, seems to have found the right balance between a fast-refreshing display that adjusts on the fly and good battery life. When we tested OnePlus' new flagship with its dynamic display enabled, it lasted for 10 hours, 40 minutes on our demanding battery test. That's well above average for a smartphone and close to landing on our best phone battery life list. Even better, when we set the phone's display to 60 Hz, it didn't impact battery life at all." https://www.synaptics.com/company/news/rio-touch-controller-power-efficient-ltpo-displays

DISPLAY	
Type	LTPO Fluid AMOLED Display Capacitive Touchscreen, 1B Colors, Multitouch
Display Size	6.7 Inches
Resolution	1440 x 3216 Pixels
CAMERA	
Back Camera	48MP + 8MP + 50MP + 2MP, autofocus, LED Flash
Front Camera	16MP (Selfie Camera)
Camera Features	Hasselblad Color Calibration, Dual-LED Flash, Auto-HDR, Panorama

https://www.electrorates.com/oneplus-9-pro-5g-price-in-ghana-1064.php